

SIMULATION OF MASS STORAGE SYSTEMS OPERATING IN A LARGE DATA PROCESSING FACILITY

Richard Holmes

We are studying the kind of data processing facility that we will need in the near future to meet the expected workload and to obtain the desired operational benefits, including cost benefits. The most recent studies in this area have centered on facilities built around mass storage systems. A mass storage system, as we use the term, is capable of providing storage for up to 1×10^{12} bits of data and access to any part of this data within a few seconds. This quantity of data is equivalent to about one year of the data flow into our facility.

The configuration in which such a mass storage system might operate is shown in Figure 1. The mass storage system is shown here providing storage for data between the input processor and the intermediate processor, which is a UNIVAC 1108 complex. The mass storage simulation program simulates the behavior of such a mass storage system operating on-line with the UNIVAC 1108.

The simulation program was written to aid system designers in the design of a new data processing facility. The simulation accomplishes this by providing a tool to measure the overall effect on the facility of on-line mass storage systems and by providing a means for measuring and comparing the performance of competing mass storage systems.

Table 1 shows how well the simulation performed. Four different cases were simulated for a 1-hr period of production processing. Each case required only 2½ min to simulate. In the first case, magnetic tape was used to input data to the UNIVAC 1108; this is the present mode of operation of the UNIVAC 1108. The second and third cases were mass storage systems, and the fourth case was an idealized situation which put an upper bound on the amount of production that can be processed in the 1-hr period. A large difference in throughput between mass storage system 1 and mass storage system 2 is probably explained by the figures in the last column, which

show the amount of data available within milliseconds to the UNIVAC 1108. Mass storage systems have the characteristic of providing millisecond access to that subset of the total data which is mounted in the reading device. Mass storage system 2 had very little data available within milliseconds and had to spend too much time performing time-consuming "fetch" operations to retrieve additional data.

These results show that competing systems can be compared by the use of the simulation program and that the simulation program can be used as a design tool by system designers. Future plans for the simulation include (1) making it easier for designers to use, (2) simulation of other mass storage systems and comparisons of them to those discussed here, and (3) enlargement of the scope of the simulation to include a larger part of the operations of the facility, such as the on-line input of data from the input processor.

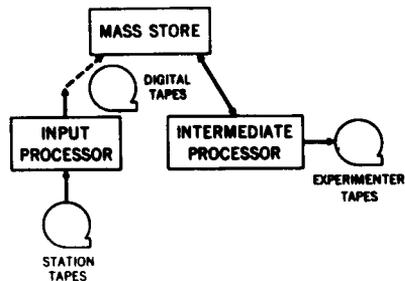


Figure 1--On-line mass storage system block diagram.

Table 1--Results of 1-hr simulation of Univac 1108 processing.

SYSTEM	JOB COMPLETED	DATA AVAILABLE IN MILLISECONDS (REELS)
TAPE (EXISTING)	24	1
MS #1	32	50
MS #2	2	0.1
IDEAL	38	∞